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## Background

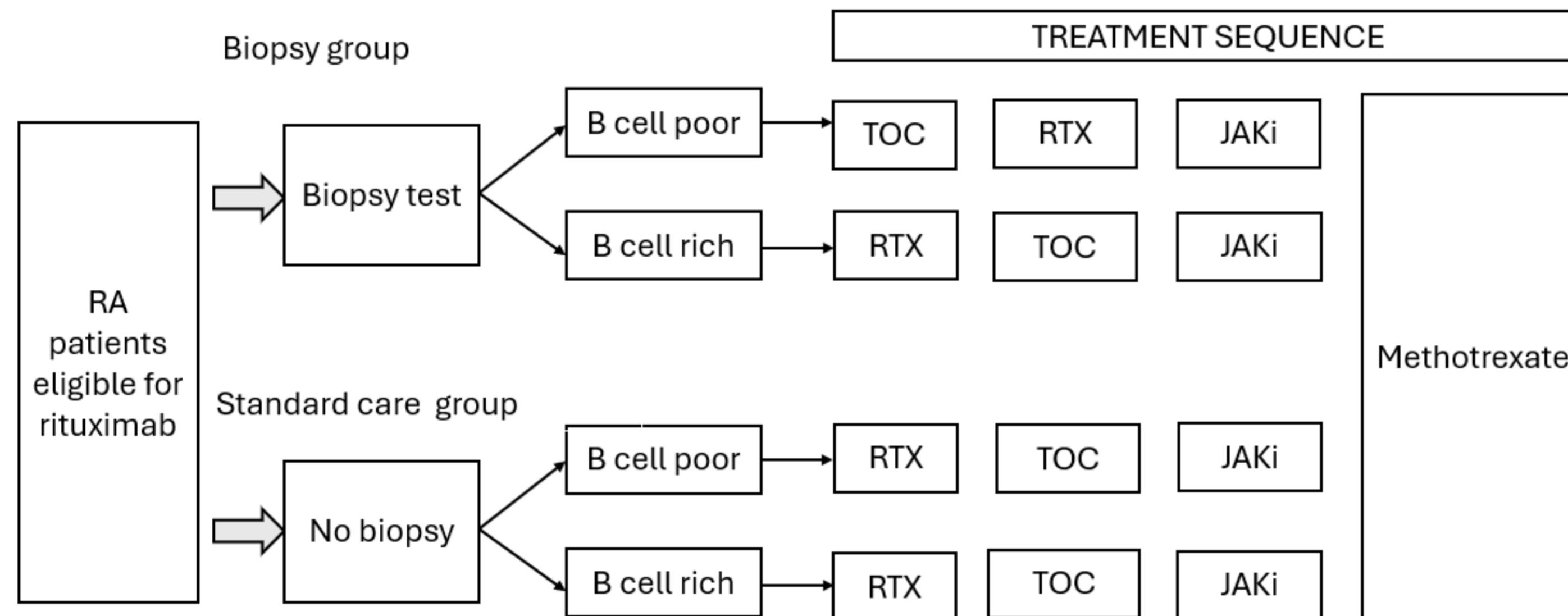
- Treatment response in rheumatoid arthritis (RA) is heterogeneous, and current trial-and-error therapy leads to repeated biologic switching, delayed disease control, and higher healthcare costs.
- Synovial tissue analysis offers a precision approach by identifying molecular signatures that may predict treatment response.
- A global phase IV clinical trial R4RA demonstrated that patients lacking synovial B-cell signatures (B-cell poor) had significantly better clinical responses to tocilizumab versus rituximab<sup>1</sup>.
- These findings suggest that synovial biopsy-guided treatment selection may optimize second-line biologic therapy.
- An economic evaluation is required to determine whether improved outcomes justify the added costs of synovial biopsy implementation.

## Aim

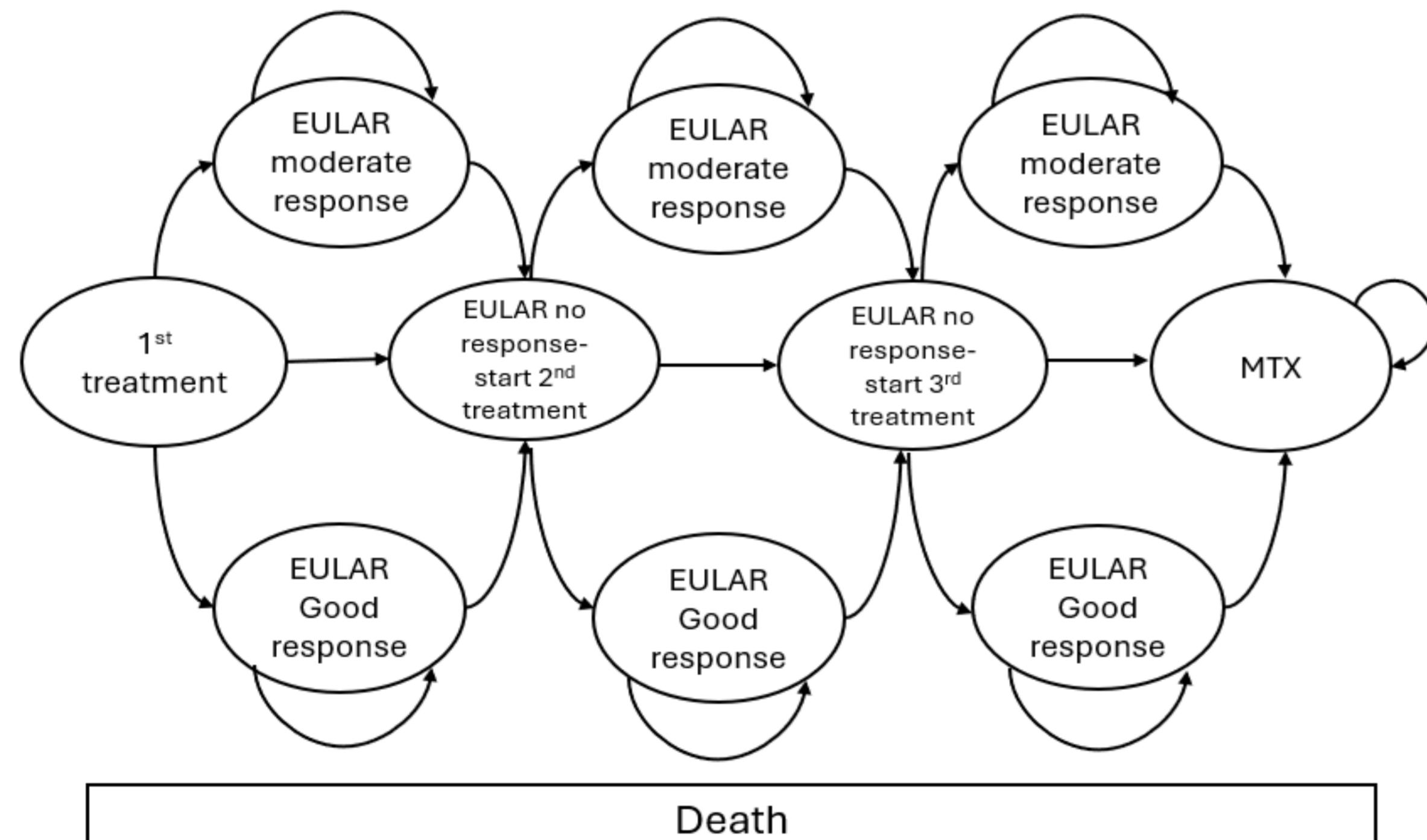
- Evaluate the incremental costs and health outcomes of synovial biopsy-guided treatment versus standard care after TNF- $\alpha$  inhibitor failure in RA.
- Identify key drivers of cost-effectiveness associated with implementing this intervention in clinical practice.

## Methods

### Decision Tree - Patient classification before enter Markov model



### Markov Model – Lifetime disease progression simulation



RTX: rituximab, TOC: tocilizumab, JAKi: Janus kinase(JAK) inhibitor, MTX: Methotrexate, EULAR: European League Against Rheumatism  
EULAR response criteria are used to evaluate treatment response in patients with RA by classifying clinical improvement based on changes in the Disease Activity Score in 28 joints (DAS28)

### PICO

Population: People with RA eligible for rituximab  
Intervention: Synovial biopsy-guided treatment  
Comparator: Standard of care  
Outcomes: Costs, QALYs, ICER

### Model Setting

Perspective: NHS England  
Cycle Length: 6 months

### Intervention Cost

- Cost of synovial biopsy-guided procedure were estimated via a micro-costing study<sup>2</sup>
- Best- and worst-case cost estimation using lower and upper value of parameters were included in the scenario analysis

### EQ-5D estimation: Two-step mapping method

- Step1. Pain VAS predicted using mapping study involving HAQ<sup>3</sup>
- Step2: EQ-5D predicted using mapping function involving HAQ + pain VAS<sup>4</sup>

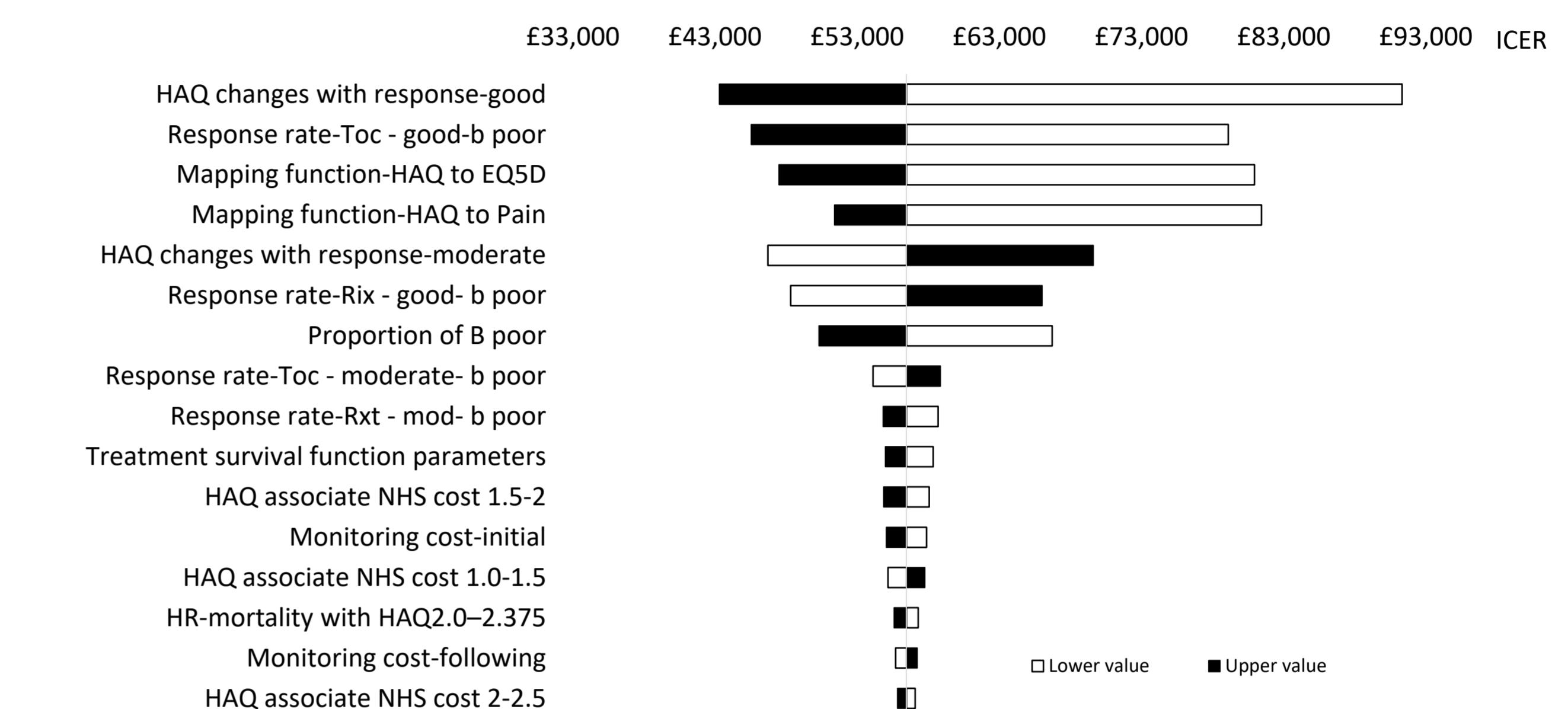
Pain-VAS: Visual Analog Scale for Pain, HAQ: Health Assessment Questionnaire

## Results

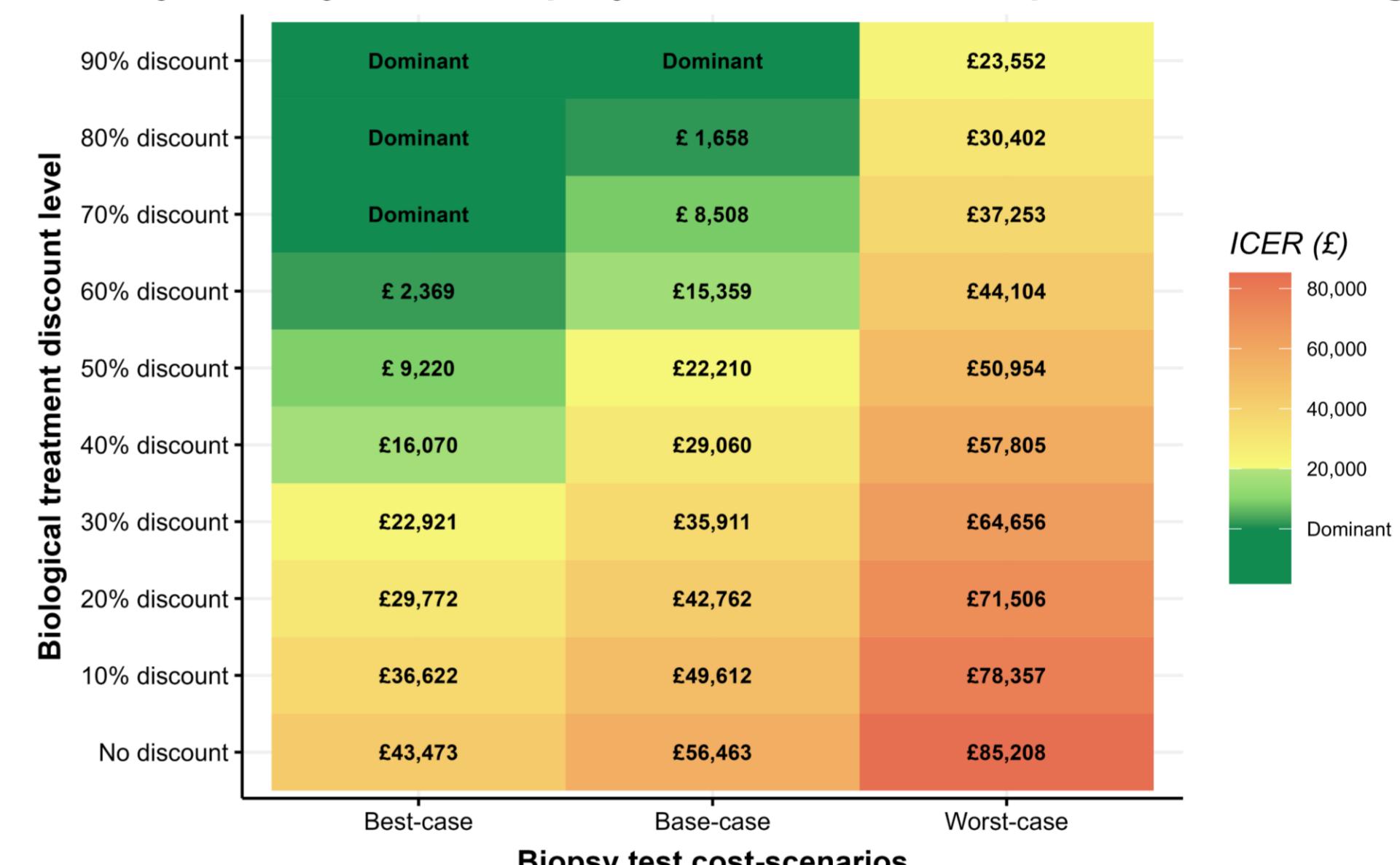
### Base-case result

	Costs	QALYs	Incremental Costs	Incremental QALYs	ICER
Biopsy-guided treatment	£104,873	5.660	£838.46	0.015	£56,462
Standard of care	£104,035	5.645			

### One-way sensitivity analysis - Tornado diagram

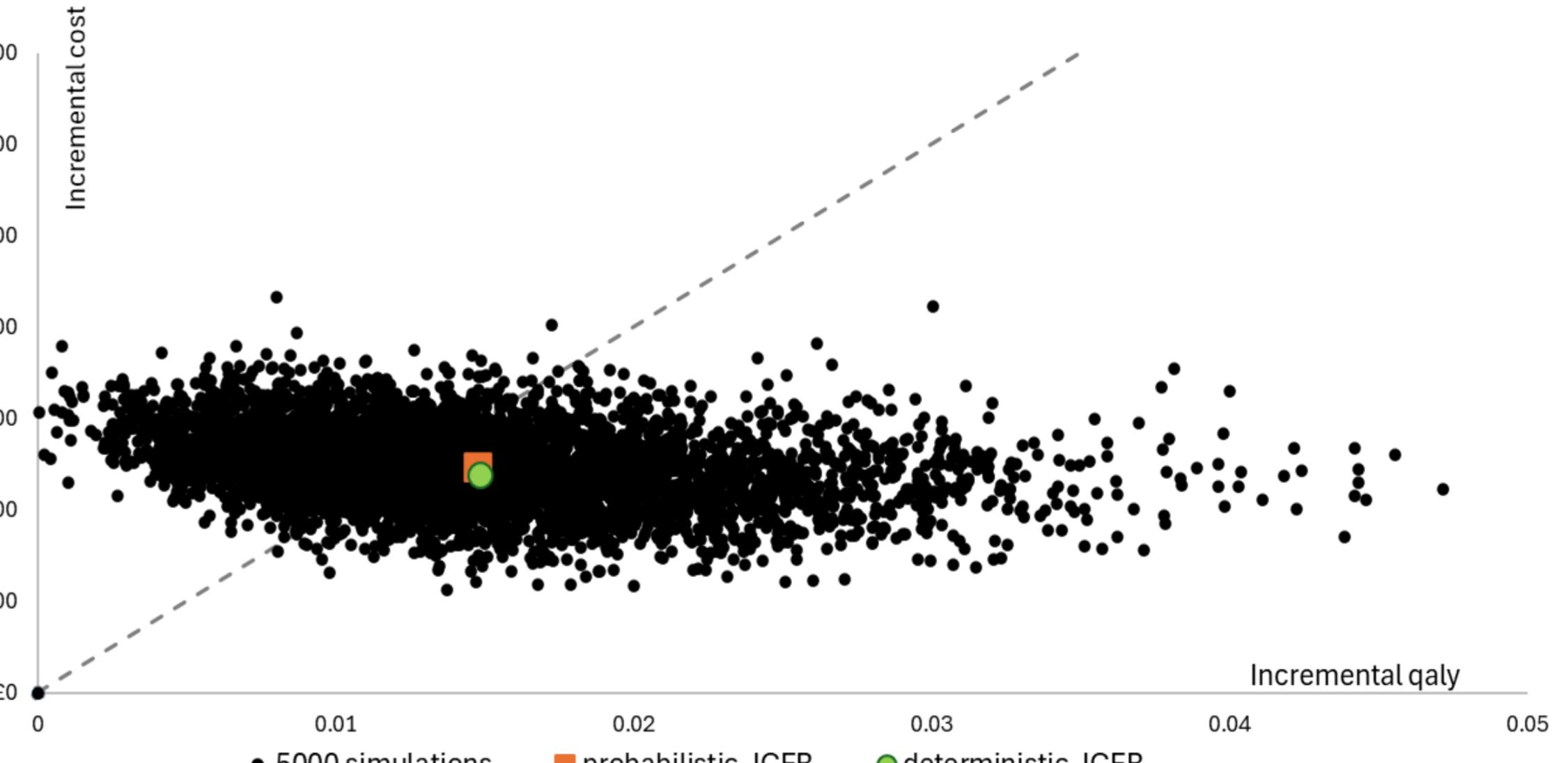


### Two-way sensitivity analysis: biopsy test cost and price of biologics



- When the biopsy test price is the best-case cost and the discount on biologics is over 40%, the biopsy-guided intervention will be cost-effective under the WTP of £20k

### Cost-Effectiveness plane using best-case biopsy-guided cost with 40% discount on biologics cost



- The probability of biopsy-guided intervention being cost-effective is 59.34% under the WTP of £20k

## Discussion

- Key drivers of cost-effectiveness are reducing the cost of the biopsy-guided procedure and securing price discounts on biologic therapies.
- Clinical integration can be supported by implementing standardized training programs to lower biopsy-related costs.
- Clinical effectiveness and utility estimates are influential parameters, highlighting the need for a pragmatic RCT with economic evaluation.
- Using synovial biopsy earlier in the treatment pathway (before biologics) may provide greater clinical benefit and should be explored.

## Reference

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